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ABSTRACT

A federally sponsored project explored educational practices, originating in diverse communities, in which teachers used educational technology in innovative ways to meet the needs of children with disabilities. This booklet describes projects at 11 sites around the United States. It presents a model for technology integration, emphasizes the need for creating a climate for change and a clearly defined mission, examines ways to find resources, notes the need in some districts for a dedicated position to deliver teacher training, and discusses what technology means to students. An appendix describes the conceptual model of the processes in technology innovation and integration. The booklet concludes with paragraph-length descriptions of the 11 programs and a list of 22 suggested readings. (JDD)

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Opening The Doors:

USING TECHNOLOGY TO IMPROVE EDUCATION FOR STUDENTS WITH DISABILITIES

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Opening the Doors:

Using Technology to Improve Education for Students with Disabilities

Macro International Inc.

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This volume presents examples from school districts that have successfully integrated technology into their special education programs. These examples are used to highlight the key elements necessary for true technology integration in any setting. These key elements have been identified in previous research and were clearly confirmed in the case study research conducted at 11 sites for this project.

Our sincere thanks go—to the school sites participating in the research for the project:

Central Kitsap School District, Silverdale, Washington
Toms River Regional School District, Toms River, New Jersey
Palm Beach County School District, West Palm Beach, Florida
Evesham Township School District, Marlton, New Jersey
Marion School District, Marion, Arkansas
St. Bernardine's Head Start Center, Baltimore, Maryland
Enumclaw School District, Enumclaw, Washington
Norfolk Public Schools, Norfolk, Virginia
Bucks County Intermediate Unit, Doylestown, Pennsylvania
Florida School for the Deaf and the Blind, St. Augustine, Florida
Crestwood Community School District, Mantua, Ohio

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Introduction: A Search for Promising Practices

Teaching children with disabilities has always meant going the extra mile: taking risks to solve baffling problems, taking tools available to the ordinary teacher and using them in extraordinary ways. Sometimes, the adaptations were simple, like using a piece of chalk to draw pictures instead of just writing words on a blackboard, or repeating lines from a textbook until a child was able to grasp them. But the task of teaching children with disabilities was often more complicated, and often more frustrating. It was struggle enough just to get across the point that children with disabilities deserved an education. Finding ways to provide it was usually left to the ingenuity of the individual teacher. Some made heroic efforts against great odds.

Today, it is a matter of national policy that children with disabilities are to be educated in such a way as to reach their full potential. A series of laws has held that instruction should be provided in the least restrictive environment, meaning that more and more students are now joining mainstream classes. The movement toward full inclusion is being assisted by a simultaneous revolution in technology. Not only do new technologies like microcomputers and laserdiscs allow the special educator far more

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options than were known in the past, they also permit the regular classroom teacher to tailor instruction to the needs of children with disabilities.

But how does all this happen? How do teachers find out about new tools and learn how to apply them correctly? And in the final analysis, who is responsible for bringing the technology revolution into the classroom?

These are some of the questions posed in a recent exploration by Macro International of promising practices involving technology in programs that educate children with disabilities. The 2-year project was sponsored by the Office of Special Education Programs of the U.S. Department of Education, and included a search for educational practices originating in diverse communities around the country. The project team visited 11 sites, ranging from a rural district in Enumclaw, Washington, to an inner-city Head Start center in Baltimore, Maryland.

During their site visits, the researchers found remarkable inventiveness among the many teachers and instructors they encountered. They saw a wide range of individual practices worth trying elsewhere. But as they looked at how entire schools and systems meet the challenge of educating children with disabilities, a recurring theme began to become clear: It is administrators—decisionmakers—who can really make or break the program. Successful technology-based practices cannot sprout and grow all by themselves. They need thoughtful introduction that is sensitive to the climate of the school; they require material resources that might not be available through conventional channels; and they demand mentoring and support for those who will use them in the classroom. Decisionmakers at the school and district level can lead in ways that ensure these elements are present—or can generate resistance by pushing new technologies into schools unprepared for them.

In the following chapters, you will see some reflections on the findings of this project and read the stories of some creative, innovative people who have found their own way—and are eager to share their successes.

Chapter I: Changing The Way We Teach

In the Industrial Age model of schooling that has prevailed since the last century, there is a very simple flow of information: from one teacher to a group of students seated at desks. This arrangement assumes that the teacher possesses the important knowledge and simply transmits it to students—aided by such tools as a blackboard and chalk to illustrate the message being conveyed, and pencils and paper with which students can copy down what the teacher is saying. This is a neat little assembly line model, which does a fine job of educating those who are bright, interested, and capable of concentrating for long periods of time while sitting at desks. For others, its failure rate is alarming.

Today's workplaces are being transformed by an avalanche of technological innovations. Instead of a sequential process in which each worker need only perform one discrete task, today's computer-driven factories empower each worker with access to knowledge of the entire process. In the most advanced workplaces, that worker even has the authority to shut the process down if a defect is found in the product. By basing the production process on information, and providing instant feedback about progress, the new technologies are transforming our notion of work.

Yet, until recently, schools have been notoriously resistant to this kind of wholesale change. While individual teachers might venture into using a particular electronic gadget for their own students, they often risked being seen as eccentric. And as long as technology use was considered a fringe activity rather than a central element of instruction, the market for new products remained thin.

"Children who would never have been able to compete with their age peers are now able to do that. And I think as we get more and more into inclusion, we're going to get into more and more technology."

SHIRLEY UNDERWOOD,
DIRECTOR OF SPECIAL EDUCATION,
NORFOLK, VIRGINIA

Following the introduction of the personal computer, however, the pace of change quickened. In business, industry, and government, microcomputers quickly became essential—and education got the spirit too. Among the most avid seekers of computer technology applications were those involved in educating children with disabilities. Their presence in the market was enhanced by the passage, in 1975, of P.L. 94-142, which mandated that children with disabilities receive an education commensurate with that of their peers. The consequent drive toward mainstreaming meant that some way must now be found to educate children of very different ability levels in the same buildings and classrooms. New technologies could help, by allowing children with disabilities to proceed through the curriculum in an appropriate style and pace.

Yet, the teachers who were most energetic in pursuing new technology applications soon hit walls of institutional resistance: Budgets that would not allow for flexible use of funds; schedules that could not bend to permit thorough or cost-effective uses of new equipment; insufficient time for thoughtful training in technologies that demanded an entirely new view of the teaching process. These were all problems whose solutions lay beyond the power of individual teachers. They required school-wide and often district-wide leadership. The primary challenge to these leaders was the *integration* of new technologies into the daily routine of the school.

"Technology definitely has changed my role as a teacher. You are no longer the lecturer, the giver of information. You are now a facilitator, allowing kids to take more control over their education."

LYNN REGAN, SPECIAL EDUCATION TEACHER, TOMS RIVER, NEW JERSEY

A Model For Technology Integration

In a 5-year project for the Office of Special Education Programs, U.S. Department of Education, Macro International developed and validated a model of the processes required for technology innovation and integration. (A visual representation and description of this model appears in the Notes section of th s book.) This conceptual model relied on the understanding that every aspect of curriculum and instruction requires administrative and logistical support—and that technology presents its own distinct set of needs. It is well understood that new technologies require teacher training, but simply learning how to operate the machinery is not enough. Exploiting the full potential of a new technology may demand a whole new set of work habits, a new way of thinking about subject matter and student capabilities. Even the most conscientious teacher cannot accomplish all of this change alone; effective integration of technology is an *organizational* activity.

"Teachers just have too much to do. They just can't keep on top of all the new innovations, the new and different ways of using the technology. They need help to keep the computers going, keep the ideas flowing, and help keep the students motivated."

BILL ZIEGLER, TECHNOLOGY SPECIALIST, BUCKS COUNTY, PENNSYLVANIA

The Macro model of technology integration places the student at the center, with the improvement of classroom instruction as the axis around which other activities revolve. But it also places the administrator in a critical position, responsible for developing organizational strengths that respond to the needs of all students. It is administrators who, in most schools, have authority to provide the material resources and the power to cultivate the human resources necessary for successful use of advanced technology.

The variability in the organizational characteristics of school systems affects the level and manner in which decisions about technology are made. But, in all cases, those in the position to acquire and allocate resources play a critical role in what happens at the classroom level. Decisionmakers who can make a difference include both district and building administrators. In this book, you will see superintendents, special education directors, a vocational education director, technology coordinators, program directors, and principals, all working to improve educational outcomes for students with disabilities through the use of technology.

Many prior efforts to describe organizational conditions for effective technology integration have entailed complex flowcharts. They were very often prescriptive, and tried to impose upon different kinds of organizations a single view of what works. Instead, the Macro research project recognized that local conditions are too variable, and teachers too intently focused on their own students' needs, for a single recipe to work everywhere.

The Macro model for technology integration is remarkably simple, and presents the general outlines of a process that can be adapted widely. We define the term as follows:

> ***Technology integration is an ongoing process of innovation in which equipment and software, training, support, policies, procedures, and classroom activities are routinely and effectively used to meet the needs of instruction and schooling.***

The Model In Practice

In this volume, you will see how this definition and model play out in exemplary real-life settings. You will see some essential ingredients that must be present in any successful application of technology—but the mix will be different from site to site. Most are relatively traditional settings. A few are moving rapidly toward restructuring on a large scale. The relationship between technology and the restructuring of schools is perhaps best expressed in the words of Eugene Hertzke, Superintendent of the Central Kitsap School District in Washington:

"We can have technology within our schools without restructuring—and that's where most schools are. But I don't believe you can have restructuring without massive use of technology—and that's where we are."

This relationship is of special import to those who educate students with disabilities. Such students can certainly receive instruction in a school lacking advanced technology, but if they are truly to be educated to the full extent of their abilities, and to do so in the same environment as their nondisabled peers, computers and adaptive technologies are essential. Creating a community of learners, where some happen to be disabled, is a challenge that no school can meet without help.

"We've got to reach all children. We've got to use everything that's available to us to maximize the learning opportunities of all children."

JOHN HEATH, PRINCIPAL, MARION, ARKANSAS

Chapter II: Creating a Climate for Change

Defining the Mission

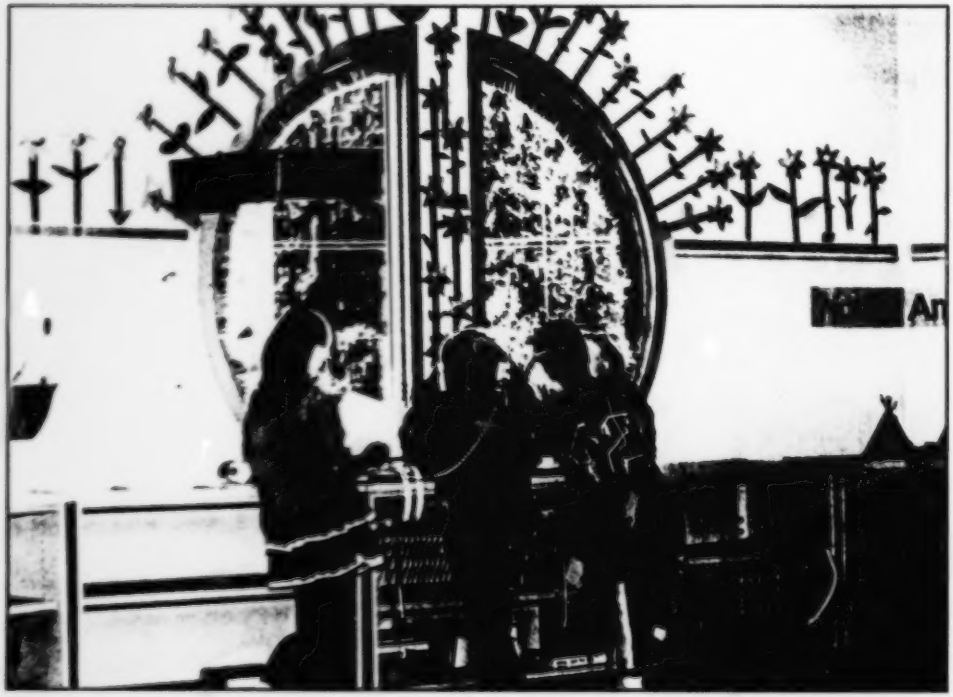
A raft of research on effective schools has found that improvement strategies stand the best chance of success when schools have a clear mission around which to rally support. In the Central Kitsap district in Washington State, where Superintendent Eugene Hertzke identifies his own role as creating "a climate for change," the mission is described in a document called *Strategy 2020*.

"What got us started on restructuring—I prefer saying developing a culture for change—is looking at a number of data that show that we weren't really meeting all the needs of our students."

EUGENE HERTZKE, SUPERINTENDENT,
CENTRAL KITSAP, WASHINGTON

Through a creative process that built on contributions of everyone from custodians to the superintendent, Central Kitsap has designed two new elementary schools to showcase state-of-the-art technology and the advanced instruction it supports.

Both Silver Ridge Elementary and Cougar Valley Elementary have over 250 computers plus an assortment of laserdisc players and multimedia equipment. All of this technology is fully integrated into school operations and classroom practice. The schools' programs are a synthesis of best practices harvested from successful programs throughout the district. And other Central Kitsap schools are benefitting in tangible ways, as new methods developed and tested in the two flagship schools radiate through the entire district.



"What we've done is made sure we've stayed with the spirit of Strategy 2020, but each one of us expands those recommendations in a different direction. We're able to make decisions on a local level about how we're going to implement best practices."

B.J. Wise, Principal
Central Kitsap, Washington

Strategy 2020 created a substantial challenge for the district's special educators. The main lines of the strategy were the product of work by committees of teachers, administrators, parents, and others who worked on topics such as technology, thinking skills, curriculum integration, and instructional strategies. Concerning special education students, the plan contained a clear philosophy—that, as much as possible, children with disabilities should be educated in their home school along with their nondisabled peers.

Principal Steve Anderson explains how this "blending" philosophy works at his elementary school:

"When you're in the classrooms, you'll see that all of the students with disabilities are mainstreamed into the regular classroom for the majority of the day. We have hired three special education teachers who work alongside the regular classroom teachers. It boils down to two teachers working together to provide the best educational environment for all of the students in the classroom."

Toms River, New Jersey, offers another view of how visionary leadership employs technology to improve practice. The district makes explicit its beliefs about the right way to educate children with special needs, then supports those beliefs with technology. Its mission statement describes a child-centered philosophy. For special education teachers, this means developing a multisensory approach to instruction to unlock students' talents. The use of multimedia technology provides a good mix of hands-on activities, student involvement, and opportunity for students with a variety of learning styles to succeed.

Lynn Regan, a Special Education Teacher at Intermediate East, puts it this way:

"Students with disabilities need to incorporate all their modes of learning, whether they're an auditory learner, a visual, a tactile, or a kinesthetic learner. We need to use all of these in order for them to learn. And I believe that multimedia technology allows you to tap the multisensory approach."

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Students in Regan's resource room and computer laboratory classes develop multimedia projects as they pursue classroom objectives such as improving communication skills. Students write scripts and create television shows, publish mock "newspapers from the future," produce video news reports and print newsletters, and even develop instructional videos and software. Writing is encouraged through the use of computers, and oral skills are developed as students do both live and recorded presentations of their written work.

"One thing I really enjoy about working in this district is that our administrators and staff members are always willing to sit and listen and talk about ideas on how to improve education."

LYNN REGAN,
SPECIAL EDUCATION TEACHER
TOMS RIVER, NEW JERSEY

Regan's schedule has been adjusted to help spread the practice beyond the resource room. She consults with teachers of self-contained classes as well as those who teach regular education students. Her selection by *Technology and Learning* as 1990 Teacher of the Year brought the school a valuable dividend—a new computer lab, courtesy of IBM.

Many other teachers are also succeeding in the Toms River Regional School District, and that may be due to decisionmakers' willingness to support risk-takers. Larry McCauley, the Intermediate Special Education Supervisor, and others have supported many instructional innovations.

"We will experiment with anything that comes across our desk. We let it run for a week or two. We always know we're going to take a step backward, take a look at it, analyze it, summarize it, pick it apart, and if it's not working, we'll take on another direction. If it is working, we go with it."

LARRY MCCAULEY,
SPECIAL EDUCATION SUPERVISOR
TOMS RIVER, NEW JERSEY

Examples like this can help reframe our definition of leadership. It does not necessarily come from the top, and is not necessarily bold or heroic. Sometimes it simply consists of recognizing a good idea and giving its sponsors some room to maneuver.

"We have to structure the process whereby leadership can come from other persons, and that's the real key role that top-level administrators play."

EUGENE HERTZKE, SUPERINTENDENT
CENTRAL KITSAP, WASHINGTON

"You have to delegate responsibilities and give people support, give them room to grow and be creative."

JOHN FITZGERALD, PRINCIPAL
TOMS RIVER, NEW JERSEY

Building a Network

Kate Gildan directs the vocational/technical education department of Florida's Palm Beach County School District. She believes in providing her staff with plenty of opportunities to develop professional networks with principals, teachers, and administrators in other departments, while also creating tight links with support services such as the Florida Diagnostic Learning Resource Service—FDLRS. She also believes in the power of technology.

Under Kate Gildan, the vocational/technical education department has sought to serve as many in the district as possible. She has encouraged her staff to develop programs that combine the efforts and resources of many districtwide departments, including those for exceptional students' education and computer services. Together, these departments can better address the needs identified at the local school level. The specialized expertise within each department is allowed to complement and spur on new projects.

"In all of education today, everyone's under the same economic gun. We're having to do a lot more with a lot less. And if we don't use the technology that is currently available and coming along, and also make use of the transferability of technology from school to work, we're going to be in trouble."

KATE GILDAN,
VOCATIONAL/TECHNICAL EDUCATION DIRECTOR
PALM BEACH, FLORIDA

Helping staff step beyond school building and departmental boundaries has paid off in Palm Beach. For Herman Matos, a technology specialist in Gildan's department, the emphasis on networking opened an important door. Seeing that students with disabilities often lack the chance to develop job-ready skills, Matos was seeking a way to include them in vocational education programs.

The opportunity came when Matos attended the superintendent's committee for special needs. There, he met the principal of a high school attended by three students with visual impairments. Matos and the principal began talking about the students and possible technology solutions to problems they were encountering. Matos then turned to Janeen Clinton of FDLRS—and together, they found a way to adapt for classroom purposes an electronic bulletin board system originally set up for teacher use.

Now, the Palm Beach Voc/Tech electronic bulletin board system provides students with disabilities access to instructional materials, opportunities to improve communication skills, and exposure to workplace experiences. Matos and Clinton have continued to work together to make sure that others have access to the benefits of technology. For example, they have implemented a speech-recognition system for students whose physical disabilities limit use of keyboard-based systems; now these students are able to participate in computer-assisted design and manufacturing activities to develop skills acutely needed in today's business world.

"They have the computers and access. They're doing this on their own now. They've gone ahead and I'm just facilitating them. I want to help them develop the skills to survive on their own in this world."

HERMAN MATOS, VOCATIONAL TECHNOLOGY SPECIALIST
PALM BEACH, FLORIDA

Taking a Risk

What is particularly striking about school districts that have adopted revolutionary new approaches to technology—and what sets them apart from more convention-bound districts—is the exhilarating sense of freedom shared by teachers, instructors, and administrators. To a striking extent, these exemplary districts have learned how to learn from experiences where things did not work out exactly as planned.

With increased demands for school accountability, educators are expected to get results for their students. But experimentation is the lifeblood of innovation, particularly in dealing with the needs of students who routinely require unconventional strategies. Unless both trial and error are permitted, an emphasis on results can stifle innovation.

"We encourage people—principals in particular—not to be afraid of experimenting. We've run many pilots through the years. Most have been successful, and when successful, we expand it throughout the school district. And, if not successful, then we learn from that. We change it or try something different."

LEROY MELAND, SUPERINTENDENT
EVESHAM TOWNSHIP, NEW JERSEY

In 1988, Norm Allison was principal of Evans Elementary School in Marlton, New Jersey's Evesham Township School District. During a visit to the local high school, he noticed that many of the special education students there had been in programs for students with mild disabilities at his elementary school. This prompted him to start looking for ways of helping students like them make the transition into regular academic classes. Allison enlisted the aid of Special Education Teachers Cathy Hinney and Pat Behen. Together, they asked a simple question: What do these students need to make it in the mainstream? Their analyses turned up a fairly straightforward answer: Better study skills to enable them to review the classroom instruction on their own. A quick practical approach to taking notes and following the classroom lessons was needed.

Excited by the prospect of experimenting, Hinney and Behen began planning lessons and activities using a form of shorthand called speedwriting. There was some risk involved: Would it be difficult for perceptually impaired students to learn this new skill? But Allison and his colleagues persisted, adding the use of audiotape recorders and microcomputer word processors as further steps to reinforce students' memory of what they had heard and noted in class. The students were also given composition assignments and taught to use computers as an integral part of the writing process.

To Norm Allison, the project was well worth the effort. Speedwriting and word processing skills may enhance any student's learning, he notes, but for the students in the perceptually-impaired class, they are the "key to their independence."

The risk paid off—so much, in fact, that more classes adopted speedwriting the following year. Later, other teachers of perceptually impaired students were taught speedwriting in order to teach it to their classes. From its trial stage, the program has now expanded to the middle school, so students in grades 3 through 8 are able to participate in this innovative program.

The atmosphere surrounding this successful experiment might be summed up by District Superintendent Leroy Meland, who said to Allison:

"You weren't afraid to fail. I think the beauty of it was that you were willing to try it and you had the opportunity to fail. And you felt there was no real loss in trying something and falling down."

"The skills of recording, word processing, typing, and speedwriting would enhance any student's learning, but for these students, they're the key to their independence."

NORM ALLISON, PRINCIPAL
EVESHAM TOWNSHIP, NEW JERSEY

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Putting the Horse Before the Cart

> ***"I think the basic way to approach the use of technology in a school district is to ask what need is going to be met? And the instructional needs of the students have to be the focal point."***
>
> EUGENE HERTZKE, SUPERINTENDENT
> CENTRAL KITSAP, WASHINGTON

While technology was successfully introduced in each of these cases, it wasn't the result of a campaign to install new machinery. Rather, the adoption of new technology was the happy consequence of each district's decision to focus squarely on its primary mission—improving education for all students. Each district's leadership fostered a climate in which educators were encouraged to work together on common solutions, even if their efforts did not consistently bear fruit. What the innovative teams discovered was that certain technologies were simply indispensable to their mission.

Too often, technology is an add-on or a fad; by now, every school district has its own story of The Day the Computers Arrived and no one knew what to do with them. But when technology is the logical flowering of a clearly-defined mission, and is called in to accomplish an agreed-upon task, it stands a much stronger chance of acceptance. Everyone plays a part in the integration process, but it is up to decisionmakers to create what Eugene Hertzke calls "a climate for change."

Chapter III: Finding Resources

Locating the resources to acquire technology is not easy. Limited markets, specialized uses, and the relentless pace of innovation can all push the price of needed equipment beyond school district budget ceilings.

But effective technologies need not be expensive, brand new, or top of the line. Sometimes a vendor will offer a good deal on a device or brand of computer that is being phased out. Educational discounts are often available. In some cases, schools can cultivate special relationships with developers by agreeing to pilot-test new software. And despite the marvels of the Information Age, low technology is sometimes just as productive as high technology.

"Administrators have got to be hustlers for resources for their people because we don't have all the resources we need."

TERRY BERGESON, ADMINISTRATOR
CENTRAL KITSAP, WASHINGTON

Widening the Circle

Even if there is no line item in the school budget for educational technology, it may be possible to find numerous other ways to fund an innovative project. Of course, Federal, State, and local grants can be sought—but the money needed may not be listed under the heading of "education." In Marion, Arkansas, for example, Principal John Heath of Marion Junior High School became interested in videodisc technology after visiting a dropout prevention project sponsored by the Tennessee Valley Authority. He thought this alternative medium might be a good way to serve the needs of some of his school's at-risk students, particularly those with learning disabilities.

But there were no funds in the district's budget to purchase the desired equipment and software. Undeterred, Heath started calling around to hunt for other funding sources, and discovered that Federal Job Training Partnership Act monies could be used for dropout prevention. So he arranged for a representative from the videodisc publisher to give a demonstration for staff from the local JTPA office and people from the district's vocational education office and State education agency. Then, he wrote a grant proposal and landed the full funding—$30,000.

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"You have to look out for resources that are available, and go for them. It requires time and effort but this is what good managers need to do. We have to go beyond what's available around us and be persistent."

JOHN HEATH, PRINCIPAL
MARION, ARKANSAS

The whole process took about 6 months. To John Heath, it was simply a matter of taking responsibility for his students: "We haven't had the resources because of a squeeze in state dollars. We've had to improvise to finance our projects. That's where principals have to come in. If they want something, they can't depend on the central office to provide it for them. If you want something, you go for it."

The best news is that videodisc technology has proven to be a powerful, flexible learning tool. The teachers use it for a wide range of purposes—to present overviews, begin new topics, review areas where concepts and skills are not well established, and summarize lessons. Students can also use some programs independently, and they have begun videotaping some lessons to be viewed at home.

Planning to Succeed

St. Bernardine's Head Start Center in Baltimore, Maryland, shows how imaginative planning can create a program ready to take advantage of opportunities. Center Director Sheila Tucker and her staff believe that to have real influence on children's lives, it is necessary to enlist the support of their primary teachers—their parents or guardians. So the center provides a comprehensive, mixed-generation educational setting for both children and adults. Adult learning activities occupy the same building as the preschool, and computers throughout the center are a catalyst for many activities in both programs. Staff have noticed that children are more verbal when working on the computers; in fact, the technology seems to be a natural vehicle for stimulating communication among students, staff, and parents.

Because they saw that many of the young children's developmental delays were related to language, Tucker and her staff developed a Language Enhancement Model and piloted its concepts in the center's classrooms. In this model, parents are trained and volunteer in the classroom, adding to the number of adults available to work with the children. Two IBM computers with color monitors are used in the Language Enhancement classroom, and there is software and other materials packaged by the Mobius Corporation for the center's participation in a 1988-89 IBM/Head Start Partnership Project.

"We wanted these children to have some exposure to computers because we realized very early on the role that technology would play in the futures of these children."

SHEILA TUCKER, DIRECTOR
ST. BERNARDINE'S HEAD START CENTER
BALTIMORE, MARYLAND

The computers are blended into the preschool environment, right alongside such standard classroom features as a sand table, a water table, and a painting area. The whole setting fosters language development by putting children in a language-rich environment that provides many opportunities to see, hear, and use language.

The IBM/Mobius project gave the center its own "head start" in acquiring the needed equipment and materials. An extensive curriculum integration guide and a technical reference manual were included in the package. But the benefits were not just one-way. While St. Bernardine's got to use the hardware and a selection of exploratory, age-appropriate software, the corporate partners got the benefit of their feedback on the products they used. As a result of the Partnership Project, the computers and materials were donated to St. Bernardine's.

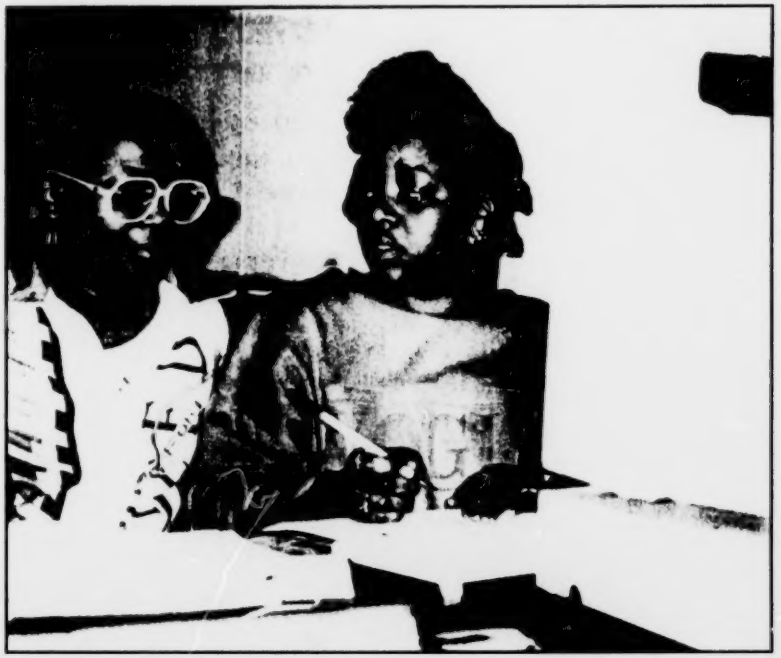
While the Partnership program was a good opportunity to introduce technology into the St. Bernardine program, Tucker and her colleagues realize that sustained success requires broader support. They have been able to win support from an impressive array of public and private agencies who share their dedication to enhancing literacy. The Baltimore City Urban Services Agency is St. Bernardine's principal source of funding, but the network of support has included the Association of Black Charities, the Literacy Network of Baltimore, and the Community College of Baltimore.

The program's holistic family orientation has also positioned it for funding under the Welfare Reform Act, which promotes welfare-to-work programs. And the addition of computers to the adult education program has made an important difference in the success and motivation of the students.

Of course, Head Start centers are relatively autonomous, so St. Bernardine's has enjoyed the flexibility needed to embark on its programs without having to ask permission. But the lesson is applicable to any administrator facing tight resources: Defining your program in the right way, and seeing beyond conventional definitions, can set the stage for getting the funding you need.

"Students excel when they feel that they are getting something worthwhile, when they think that they're part of society and not left by the wayside. So you see more push and more drive because of the use of technology."

CLARENCE TUCKER, ADULT EDUCATION SPECIALIST
ST. BERNARDINE'S HEAD START CENTER
BALTIMORE, MARYLAND



Making It Happen

"We have a motto that we keep repeating over and over: We can do anything, we just can't do everything. So we wrestle pretty hard with the question every year of what we're willing to trade off in order to get something new."

JAMES BARCHECK, SUPERINTENDENT
ENUMCLAW, WASHINGTON

Like every service that depends on public monies, funding for education rises and falls with changes in priorities. For some years, rural Enumclaw, Washington, has been able to finance its technology program through bonds approved by voters as part of the funding for new building and remodeling expenditures. Even without lavish funds, the district was able to create an innovative multimedia program. In 1992, however, voters turned down a more ambitious plan that would have locked in district-wide technology financing for a secure, 6-year term. The district's leadership is regrouping, planning to take the case to the public next time around.

However, Enumclaw provides a good illustration of how special-needs children can be served well despite inconsistencies in funding and generally tight resources. The district, under Superintendent James Barcheck, has developed a system for piloting new technology programs, in the belief that the best can be quickly replicated throughout the district. As Barcheck says, "I'm a very firm believer in the influence and impact of good models. I think everyone wants to do what's exciting and best for their students. And when they see it happening in their own building, in their own district, it spreads like wildfire."

"When I see a problem or question occur, instead of just answering it for the kids, I say, 'explore, discover, figure it out.' I need just to step back and give them the time to do that."

LAURA SANDERS,
SPECIAL EDUCATION TEACHER
ENUMCLAW, WASHINGTON

One of these programs is the Integrated Technology Classroom model, which uses an array of equipment and software to develop reading, problem-solving, and social skills. Laura Sanders, a Special Education Teacher who was also the computer specialist in her school, participated in ITC training and was quite taken by it.

ITC was not developed with special needs children in mind, but it happened that Sanders was also the teacher of a class of children who were moderately developmentally disabled. She wondered whether the ITC idea could be adapted for her own students, many of whom had IQ scores below 80. Working with district technology coordinator Pat LeBlanc, she drew up a plan for step-by-step implementation of the ITC idea in her special education classroom.

Sanders uses a single topic to structure and coordinate her lessons; this year, the topic is mammals. Students see videos, read books, and look at pictures of the mammal in question; generate a list of animal facts from the videos, and find pictures in magazines to illustrate words beginning with the same letter as the mammal's name; use the computer to complete math and language arts projects related to the mammal; and take their camcorder to the zoo or videotape a mammalian classroom visit (if the animal is domesticated!). Sanders encourages a spirit of adventure, extending even to the classroom computers. She tells her students: "Discover. Explore. Figure it out. Just do it. You can't hurt this machine unless you drop it on the floor."

Even though Sanders' class is not an "official" ITC, she has found it possible to create the technology-rich environment simply by appropriating or borrowing what she needs from within the system. For videotape dubbing, she borrows a VCR with a dubbing port from her school's official ITC. The PTA has donated a camcorder. When an additional Macintosh is needed, she finds one that is not in use and wheels it in. Sharing equipment is a time-honored tradition in schools, but this gives it a new twist. Many teachers assume that when high tech is involved, they cannot begin until the entire package is in place. Sanders has proven otherwise.

Chapter IV: Getting People Up to Speed

> ***"We have to get the people who are actually going to be using the technology to see it as a viable option to enhance and promote learning."***
>
> JOHN HEATH, PRINCIPAL
> MARION, ARKANSAS

Even in the best programs, nothing happens automatically. The best-laid plans, the most opulent materials, the most challenging curricula all lie dormant without the right people. But at site after site, it became clear that standard inservice training was not up to the task of transforming the way school staffs go about their business. Every successful school, every exemplary district has adopted its own strategy for getting existing staff to rethink their roles and learn new skills. Some have also discovered that outside help can be an asset.

In any changing organization, there is a temptation to impose radical new approaches without first observing the strengths already present. Teachers—who know best the problems they face—will often develop informal training systems simply by sharing ideas with one another. When change is dramatic, these informal networks may not be able to carry the burden of delivering important new information. In these cases, administrators may want to create a dedicated position, bringing an objective perspective and specialized skills to meet the needs of an entire staff.

The Specialist

Such is the case in the Norfolk Public Schools in Norfolk, Virginia. The district aims for full inclusion of students with disabilities in all programs it offers. Director of Special Education Shirley Underwood believes that technology is the key to reaching this goal—but only to the extent that teachers and students know how to take advantage of it. So Pat Shubert's role as Norfolk's special education technology specialist is to make sure that the right equipment is purchased, and that it is used in the most efficient and equitable manner possible.

Shubert's strategy starts with the child: For every student brought to her attention, she assesses the needs and ponders the range of adaptive devices and mainstream technology, looking for the right match. She brings to the task a breadth of knowledge, gained from her own training as a certified special education teacher, from exposure to many different kinds of schools in the Norfolk district, and from her travels to numerous professional meetings.

Hers is not a solo flight, however. As she goes about diagnosing and prescribing, she actively enlists the advice of all the teachers, special education teams, occupational therapists, administrators—and especially, parents—who know in detail the strengths of each particular child.

"It takes someone who knows disabling conditions, knows the computer programs, and then has the personality that teachers are willing to learn from. This is what our technology specialist does for us."

SHIRLEY UNDERWOOD, DIRECTOR OF SPECIAL EDUCATION
NORFOLK, VIRGINIA

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A recent episode illustrates her flexible, team-oriented approach. Shubert evaluated the abilities of a physically disabled student, then worked with resource room teacher Mandy Tribe to provide a laptop computer for his use. But it turned out that the laptop was too much machinery for the student's wheelchair tray, and that he seemed to do better with a larger keyboard. After consulting with the student's regular classroom teacher, Tribe transferred the laptop to another student, replacing it with a computer on a separate cart. Tribe remembers: "I called up Pat and said 'I'm using the laptop with another student. How do you feel about that?" Shubert's response? "You're using it—wonderful!"

While attending to the needs of individual students, another main function of Pat Shubert's job is to update the professional skills of the 400 special education teachers serving 4,000 Norfolk students with disabilities. To reach them, she holds workshops and seminars before, during, and after the school day, on weekends, and even on holidays. This is in addition to the informal one-on-one training in classrooms that she visits routinely or on request.

By placing one person at the fulcrum of technology acquisition and training needs, Norfolk makes sure that machinery and people work compatibly toward the goal of full inclusion.

"One of the rewards of putting technology with teachers and students is their excitement about all the things teachers know that they can do and that their students can do. It renews their excitement about teaching."

PAT SHUBERT, TECHNOLOGY SPECIALIST
NORFOLK, VIRGINIA

The Troubleshooter

Quality training promotes efficient uses of technology, but in some cases, more direct technical assistance is required. In the Intermediate Unit of Bucks County, Pennsylvania, calls for technical assistance in this 13-district territory are answered by Bill Ziegler.

Ziegler's job ranges from maintaining the hardware to creating his own software—but helping others improve their technology skills is of paramount importance. Without well-trained personnel, the best equipment can be wasted. The explicit part of Ziegler's job is troubleshooting—responding to distress calls, figuring out how to modify a program or piece of equipment, writing new software if needed. But underlying his work is a commitment to teaching others how to do what he does. Since most teachers are not technology aficionados by nature, it takes someone of Ziegler's persistence and calm demeanor to persuade them that machinery problems are fixable—that computers are not magical or perverse, and just take time and thought to set right.

Ziegler learned technology by experience, first as an instructor at a local residential facility and then by tinkering with speech synthesizers at his own home. He was brought to the IU by Dr. Paul Goode, its Assistant Executive Director for Special Education Services.

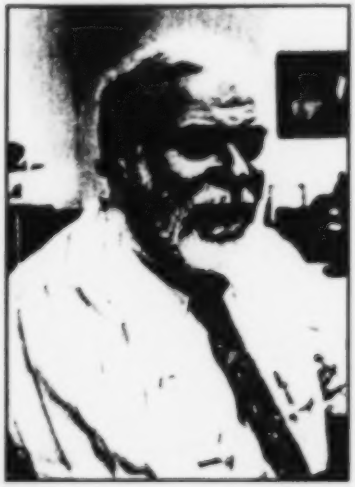
There he joined a staff that included many others who were self-taught in matters of technology. Goode's approach is to "find the right people, and give them a little latitude"—an attitude that contributes mightily to the IU's entrepreneurial, "let's-give-it-a-try" spirit.

Ziegler conducts computer classes for students at Eastern State School, a residential facility; he sees several disabled students on a one-to-one basis; he provides inservice training classes at the IU to all teachers who have students with disabilities in their classrooms; he visits classrooms throughout the districts to diagnose their needs; and when called for, he creates new products targeted at the special circumstances disclosed in his travels. For example, Ziegler has used his ingenuity to rewire and customize Muppet Learning Keys, turning them into inexpensive communications boards. And he has created a small but useful cash flow by marketing software developed for the IU's own students.

In the past few years, vision Specialist Gail Polzer and Ziegler have teamed up with local Lions Clubs in a program that really expands the definition of "human resources" while filling a crucial need for visually impaired students.

Ziegler and Polzer did some research to determine what hardware and software would be needed for translating school texts and materials into Braille, and then approached the Lions Clubs to raise funds for the hardware. What is unique is the job site: The actual work is done by inmates at the Bucks County Correctional Center. Apart from the obvious benefits to students, it also provides a constructive work program for the inmates. As Gail Polzer notes,

"The prison project was just an idea at one point and now it's something that has blossomed into a beautiful program that works."



Not every school district will find technology specialists quite as gifted as Bill Ziegler and Pat Shubert, but there is a lesson in the assortment of work they carry out. By seeing teacher needs on-site, conducting training, and facing knotty problems with individual students, they have a broad enough perspective to find unlikely solutions to problems that would perplex more narrowly defined specialists.

This is the great advantage of allowing staff what Paul Goode calls "a little latitude": It builds a corps of people able to transcend their own categories and find answers based in real experience.

"The best thing you can do is to free up people. You need to give them room to use their talents."

PAUL GOODE, SPECIAL EDUCATION ADMINISTRATOR
BUCKS COUNTY, PENNSYLVANIA

Covering the Territory

In 1984, the Resource Materials Center for the Hearing Impaired, part of the Florida School for the Deaf and Blind, began examining the potential for more use of technology. But, according to the center's John Mark Leach, their initial approach was impractical: "We would try to put something on top of the curriculum. Teachers had so much to do, that asking them to do more was unrealistic."

"We work with teachers who may already have technology in their classrooms, but don't have a vision of how to infuse it into their curriculum instead of laying it on top. We have been able to help them make full use of the technology."

JOHN MARK LEACH, DIRECTOR/TRAINER
RESOURCE MATERIALS CENTER
FLORIDA SCHOOL FOR THE DEAF AND THE BLIND
ST. AUGUSTINE, FLORIDA

Since a main mission of the center was to provide hardware and software evaluations to meet the needs of those who teach Florida's hearing-impaired students, a way was found to do that job while also providing teachers with needed training. Fifteen to twenty teachers around the State now use their classrooms as test sites for software. Based on their experiences, a guide to appropriate software is published by the center. Updated annually, it is distributed to every teacher of hearing-impaired students throughout the State—with a caution that the guide's ratings do not guarantee comparable success in every setting.

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As a first step, Leach and Robert Stern, a center inservice trainer, provide direct training in a demonstration classroom for teachers who will be conducting the evaluations. Stern also travels around the State, meeting with two teachers of hearing-impaired students at each site. At every step, there is an emphasis on real issues rather than theoretical questions. For example, at the teacher workshops hosted by the center, one popular item is a "Frustration Fair" aimed at commonplace problems teachers encounter with the technology. Stern may intentionally hobble a computer and then walk the teachers, step-by-step, through the process of getting it running again.

Good training is always sensitive to the diversity of settings and student populations teachers will encounter. By providing sound initial training to a core group of teachers, and then calling on their practical experience with new technologies, Florida's RMC provides reliable evaluation guidance while building teacher skills. It is an efficient way to accomplish specialized training for specialized needs in a State with wide geographical dispersion—a task that becomes especially crucial when budget conditions make it difficult for teachers to travel to a central location for traditional training.

Perhaps the best side effect of this program is that its participants often go on to train others. According to Bob Stern, "Teachers are teaching teachers how to become better users. And that's very important—that it's coming from the same understanding and level."

A New Zing

Children with profound d:sabilities present special challenges for educators. Unaided, many of these children can exert no control over their environments and cannot communicate well enough to make their basic needs known. Now, by using switches attached to a variety of electrical and electronic devices, educators can give these children the ability to interact in meaningful ways with the world around them. At the same time, the technology has served to unlock within the teachers a new surge of creativity.

The Crestwood Community School District in Mantua, Ohio, provides educational services for students residing at the Hattie Larlham Foundation nursing home. This model long-term residential facility accepts individuals aged 3 through 21, most of whom function cognitively in the 2- to 6-month range. With a background in speech pathology, Special Education Director Patrick Kavulla believes that despite their limited cognitive abilities, these students can learn some basic functional and communication skills. But access to appropriate technology is absolutely essential.

"We try to empower the children to communicate. We have low-tech things we use to accomplish that as well as high-tech."

PATRICK KAVULLA, SPECIAL EDUCATION DIRECTOR
MANTUA, OHIO

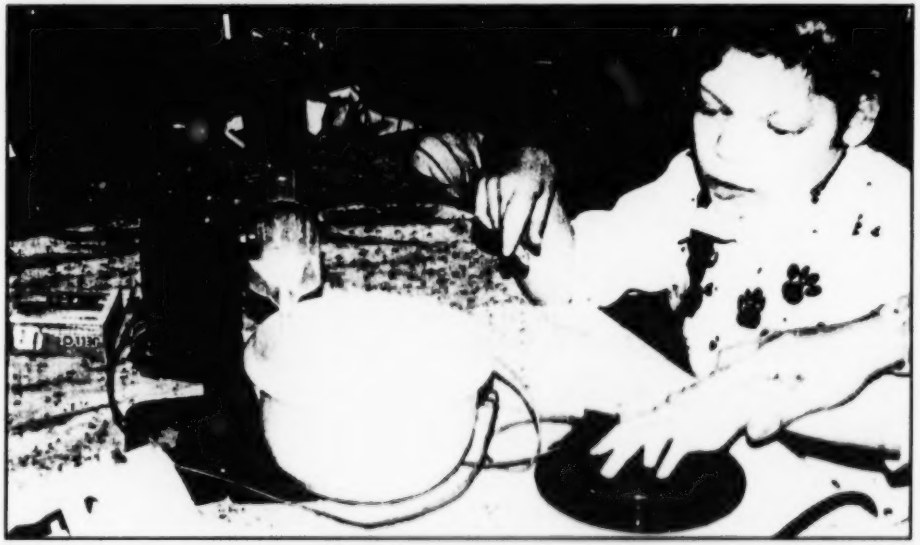
Kavulla began by asking his staff what materials they would like to have. Based on their wish list, the district purchased a variety of switches, AbleNet timing devices, dedicated communications devices such as Whisper Wolf and IntroTalker, and an adaptive firmware card for their Apple IIgs computer. Now, even the most profoundly disabled child can make a contribution to group activities. During a reading group, for example, students will take turns pressing a pad switch that activates a tape recording of the story.

The technology has been part of a larger transformation in which the school has departed from a traditional developmental curriculum focused on direct cultivation of discrete skills into a functional curriculum, in which students make active choices to accomplish real tasks. Since switches and other technologies allow the students to participate and make decisions, the task of the teacher is to create useful choices that foster development of student skills.

Adding this dimension to the classwork has added new excitement to teaching, according to speech pathologist Kathy Lamb.

"Using technology with our students has added extra zing to our program. There's always something new on the market. Technology allows us to do things with our students that we never could have done before."

KATHY LAMB, SPEECH PATHOLOGIST
MANTUA, OHIO



Teachers get training from vendors and other conventional sources, but a strong sense of teamwork has also developed within the program. Since the highest priority is placed on communications skills, much of the training derives from the combined efforts of Lamb and her fellow speech pathologist Pam Braden. They attend conferences and work with a regional resource center, then pass their findings on to other teachers and therapists.

Perhaps the biggest reward for the teachers is the pleasure the students get from these new technologies that allow them to be in control. But the zing comes from another source, too. In this unique setting, there is an administration that trusts teachers' judgment. It is their recommendations that shape the budget, and their experience that helps develop the training program. This is a lesson from which any district can benefit.

"Seeing children being successful in new ways is the best motivator that you can provide for teachers."

JAMES BARCHECK, SUPERINTENDENT
ENUMCLAW, WASHINGTON

"The motivation that the kids feel is passed along to me. That keeps us in a cycle, because we see that we're making progress."

LYNN REGAN, SPECIAL EDUCATION TEACHER
TOMS RIVER, NEW JERSEY

"I'm kind of discovering and exploring myself. And catching their excitement. It makes ideas just explode. I'm constantly looking now for more ways to supplement the program and enrich it."

LAURA SANDERS, SPECIAL EDUCATION TEACHER
ENUMCLAW, WASHINGTON

Chapter V: What Technology Means to Students

Computers have been in American schools for more than a decade now—long enough to see that they are not a panacea for all the problems of learning. Just as with every other innovation in technology or practice, the initial enthusiasm has given way to a more sober realization that there is no magic to the machines. Computers do not cause gains in achievement. Their effectiveness depends on the way they are introduced into the school, handled in the classroom, integrated into the curriculum, and correlated with all the other requirements of good teaching.

This is not to slight their importance, however. A wealth of experience and research tells us that technology-based instruction can help boost learning. The congressional Office of Technology Assessment, in its landmark report *Power On!* asserted that computer-assisted instruction can produce higher achievement in less time for all students, with special benefit for low achievers. OTA also noted especially strong gains in higher order skills such as composition and understanding of abstract concepts.

"When we first used technology 12 to 14 years ago, it was a matter of teaching kids how to use technology. Now we're saying how can technology be used in the instructional process."

EUGENE HERTZKE, SUPERINTENDENT
CENTRAL KITSAP, WASHINGTON

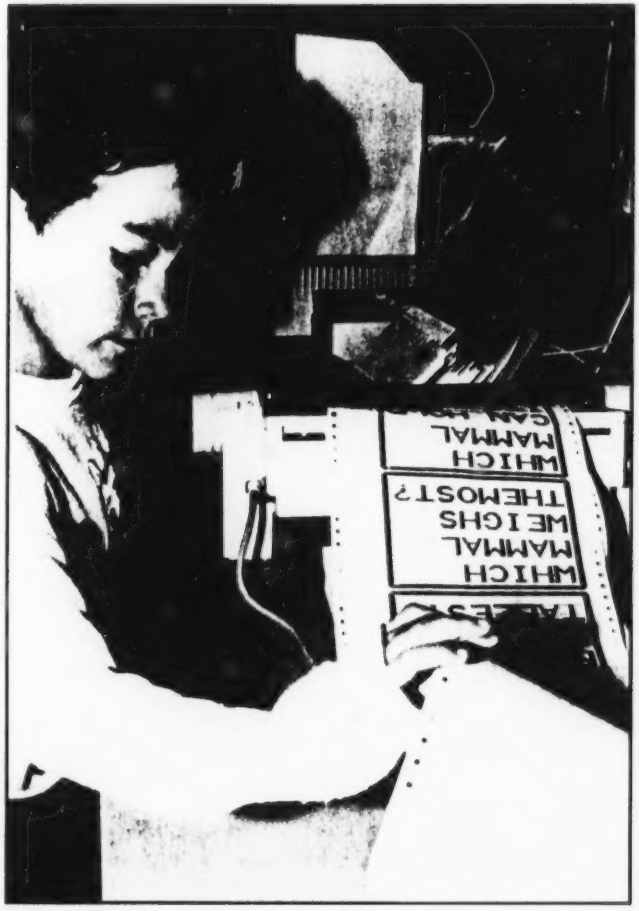
But the greatest impact, according to the Congressional study, may be for students with significant physical disabilities: those whose physical limitations or communications problems keep them from full participation in the life of school and community. As we have seen in these innovative programs, new technologies can light the path toward learning in ways thought impossible just a decade or two ago.

Patrick Kavulla of Ohio's Crestwood Community School District states a philosophy common to all the educators in this volume: "The easiest thing is to do is to look at all the disabilities these children have. The important thing we do is to look at their abilities." The preceding chapters have shown how school systems around the country are surmounting barriers by using technology to make that philosophy an integral part of the educational routine.

Consider some of the achievements wrought by the thoughtful use of technology in the districts we have examined: strong scholarship achieved by students whose disabilities once kept them outside the schoolhouse door;

"We are reaching these children in ways that they learn best. That's the key, to find out what ways they learn best and then just go for it. They're hooked. They're engaged."

PAT LEBLANC, TECHNOLOGY COORDINATOR
ENUMCLAW, WASHINGTON



the gift of literacy being brought to entire families as two generations learn together; self-confidence growing in developmentally disabled students as their talents are unlocked. These are outcomes that might have been achieved for a few students in the past; now, they are available to vastly greater numbers as technology redoubles the reach and creativity of their teachers.

By now it should be clear, however, that getting these results is not possible if technology is introduced casually or piecemeal. To a remarkable extent, these successful schools and districts have followed precepts developed through years of research on other effective schools. Districts such as Central Kitsap have articulated a coherent vision of schooling, one that calls for integration into the mainstream of students with disabilities. The sustained commitment of school leaders was evident in every case, from the imaginative training designs in Florida's Resource Materials Center to the creative fundraising in Baltimore's St. Bernardine's. An atmosphere of collegiality prevails in America's best schools, and in such an environment, schools in Toms River and Bucks County elicit their teachers' best thinking about the needs of their students.

A recent project sponsored by Apple Computer Inc. found that teachers go through five developmental phases in their adoption of technology (Dwyer, Ringstaff & Sandholtz, 1991): They start at entry level; move to adoption (where the machinery supports traditional instruction); then adapt the technology to their own situations; then "appropriate" it, altering their own teaching to exploit the technology more thoroughly; and finally, they attain the state of "invention"—in which technology is the order of the day, the basis of their work, and an inextricable part of their students' intellectual lives.

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Today, most American schools are probably at the first or second of these stages. Those serving large numbers of students with disabilities are a notch ahead, if only because special educators have always sought new techniques to make learning more vivid for their students.

But the schools in this volume have become inventors, in the most literal sense of that word. Not content to unpack the box, read the instructions, and press the correct buttons, they are every day discovering new uses, new applications, new variations that serve their students' needs. They have gotten comfortable enough to experiment, confident enough to share, and wise enough to learn from their own mistakes. Technology has become to them what paper and pencil were to the educators of a generation ago. As Shirley Underwood of Norfolk puts it. "Unlocking things is what computers are all about, and what technology itself is all about."

Special educators want many things for their students: an education as close as possible to that of their nondisabled peers, an opportunity to learn in ways that explore their hidden strengths, a set of skills and attitudes that will equip them for self-sufficiency in life after school. Today, these are realistic goals. Tomorrow, they may become the minimum expectation for every student. New technologies provide a bridge to that new level of possibilities.

"It's very rewarding to see these children responding in a way that you can really see. Technology has really opened a lot of doors. And before, there really didn't seem to be any doors to be opened."

KATHY LAMB, SPEECH PATHOLOGIST
MANTUA, OHIO

Notes

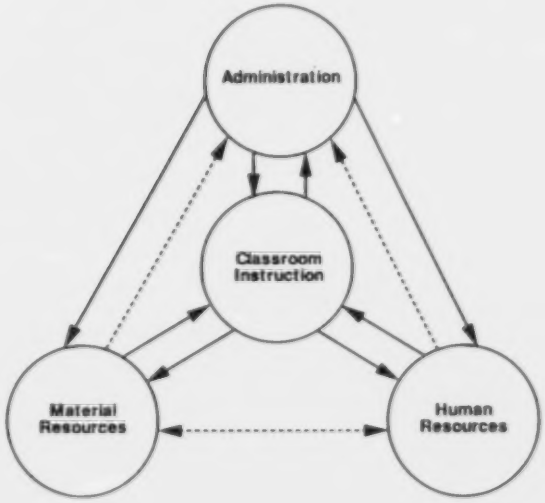
Model for Technology Integration

Technology integration is an ongoing process of innovation in which equipment and software, training, support, policies, procedures, and classroom activities are routinely and effectively used to meet the needs of instruction and schooling.

The change to technology use and the changes resulting from technology use take place over time and in stages from introduction to acceptance. Technology that is integrated becomes part of the ongoing and overall process of schooling itself. Technology is then routinely considered and used as a normal part of planning and practice.

The Model is based on the premise that technology integration in school settings is an *organizational* activity. As such, four areas, or domains, of organizational activity help to understand the many distinct but interrelated issues, activities, processes, and responsibilities involved. These areas are Classroom Instruction, Administration, Material Resources, and Human Resources.

Conceptual Model of the Processes in Technology Innovation and Integration



Solid arrows represent direct influence on technology issues.
Dotted arrows represent indirect influence.

Source: Macro International Inc. 1991. *A Model for Technology Integration. Evaluation of the Integration of Technology for Instruction Handicapped Children (High School Level): Final Report.* Under U.S. ED Contract No. 300-86-0126. Silver Spring, MD.: Macro International Inc.

Classroom Instruction can be seen as uses of technology for instructional purposes or for classroom management. Issues and processes in this area include scheduling and planning for technology use, coordination with other elements of the curriculum, classroom management practices, and supervising student participation.

As the primary activity and reason for schooling, the issues, activities, responsibilities, and processes of Classroom Instruction permeate the concerns for the other areas listed. Because the purpose of bringing technology into the schools is to facilitate the learning process, the Classroom Instruction area is the focus of technology integration activities.

Administration is concerned with the decisionmaking surrounding the acquisition and use of technology. Issues in this area are the degree of centralized control, planning, collaboration, communication, management of staff, and policies and procedures for technology implementation.

Human Resources includes all the staff involved in use and maintenance of the technology. Most obviously this includes providing training and technical assistance. But this area also includes finding, developing, managing, and allocating the staff necessary for both support and use of technology for Classroom Instruction.

Material Resources is centered on the physical aspects of technology integration, including hardware and software development, implementation, and management. Issues of particular concern include establishing and operating hardware and software systems, identification, selection, acquisition, compatibility, distribution, management, and evaluation of the physical equipment.

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48 Student learning and working independently, using a computer access system created by Bill Ziegler, Technology Specialist in Bucks County, Pennsylvania

More About the Programs Mentioned in Text

This project began with a search for promising instructional practices. From the many possible schools and programs, 11 were selected to highlight the variety of practices, technologies, levels of schooling, disabilities, and other important characteristics. Case studies of these sites became the foundation for this project. The experiences of the educators at each site were invaluable to the themes discovered and confirmed regarding successful integration of technology into the educational programs of students with disabilities. To help the reader of this photoessay book, a brief description of each practice follows.

Central Kitsap School District
Silverdale, Washington
Use of Technology in Restructuring the Delivery of Instruction

Over the last half-decade, the Central Kitsap School District has been working to define and implement a plan for restructuring the delivery of instruction. To better meet the needs of all students, technology has been used extensively in this effort. This has allowed fuller inclusion of students with disabilities in regular education classes, a primary goal of the district's restructuring activities. The district has named its vision for the future "Strategy 2020." Strategy 2020 is a far-reaching approach to "creating a culture for meaningful change." While teacher-driven, commitment to change involves administrators and staff at all levels in the decisionmaking process. The types of changes envisioned are related to how funds are allocated, training of teachers, using building-level management, being more student-centered, and changing methods of educational delivery. The Central Kitsap district has an overall vision of where it wants to go and the variety of changes needed to accomplish its goals. The vision is clearly articulated, actively employed, and understood and supported at all levels of the organization.

Palm Beach County School District
West Palm Beach, Florida
Telecommunications for Instructional Access

As a joint effort of the special and vocational education departments, a districtwide electronic bulletin board system — or BBS — allows students with physical and sensory disabilities rapid access to instructional materials. Screen reading software and hardware enables students with visual disabilities to have full access to microcomputers. Telecommunications software allows them to interact electronically with their teachers, fellow students, and peers around the country and the world. Students with physical disabilities access the BBS with speech recognition software and hardware. The goals for this project include increasing students' confidence and self-reliance, their access to instructional materials, and their vocational opportunities.

Toms River Regional School District
Toms River, New Jersey
Multimedia Projects by Students

Toms River Regional School District personnel are united in their belief that the child must always come first in school decisions. To ensure this, school administrators expect educators in the district to explore and try new methods and tools without fear of failure. With this in mind, special educators believe that their programs will be successful if they rely on a multisensory approach to learning and teaching. Holding to a child-centered philosophy and a belief in multisensory education has allowed the smooth integration of multimedia projects that have improved the communication skills, motivation, and self-esteem of students with special needs. Students in both self-contained and resource classes have participated in a variety of projects with guidance from Lynn Regan, a nationally recognized educational innovator. Classroom activities have included: creating newsletters with digitized photos and student graphics; designing and developing interactive instructional software; producing an instructional video; and writing and taping news reports for the school and community.

Evesham Township Schools
Marlton, New Jersey
A Study Skills Program Incorporating Speedwriting, Computers, and Audiotape Recorders

A program involving the use of speedwriting, computers, and audiotape recorders has been developed to improve the study skills of students with mild disabilities and to improve their performance in mainstream classes. Following an examination of the reasons for failure in academic classes, school staff decided to focus on helping students develop the skills needed to become independent learners. The program that evolved from this decision includes a form of shorthand called speedwriting, dictation into an audiotape recorder, keyboarding training, and word processing. Students learn not only these skills, but how to use them together to be successful. This program began as a pilot in a single elementary school, but has now spread throughout the school district, with students in grades 3 through 8 participating.

Marion School District
Marion, Arkansas
Videodisc To Support Mildly Disabled Students in Mainstream Classes

The Marion School District has made a commitment to support students with learning disabilities and other students at risk for school failure. At Marion Junior High School, technology is a very important part of these efforts. Videodisc and other alternative media are employed to support mainstreamed mildly disabled junior high school students in their academic classes. The school's staff made the decision to introduce videodisc technology following a review of the materials in use in a nearby program with similar goals. Principal John Heath actively pursued funding to acquire the necessary material resources. Staff believe that the technology has been a valuable addition to their program, one that is easily incorporated into whole class instruction and has resulted in significant achievement gains for students.

St. Bernardine's Head Start Center
Baltimore, Maryland
Microcomputers in a Mixed-Generation Educational Setting

The staff of the St. Bernardine's Head Start Center believes that, to have real influence on the life of a child, it is necessary to have an impact on the child's family. Integral to the philosophy of the center is the idea that the parent or guardian is the primary educator of children. The director has created a comprehensive mixed-generation educational setting for the children *and* adults in her service area. Computers are used extensively to foster the language development, communications skills, and self-esteem of preschool at-risk and language-delayed children *and* to improve the basic and vocational skills of their parents. Adult learning activities occupy the same building as the preschool. The computers are the catalyst for many activities in the preschool and adult programs that contribute to students' high levels of achievement and motivation.

Enumclaw School District
Enumclaw, Washington
Multimedia in an Integrated Curriculum

As part of a broad-based effort to prepare students for the future and to restructure its approach to teaching, the Enumclaw School District is testing various pilot programs and building model classrooms within the district. The overall philosophy of the district focuses on programs that are student centered, based on a team approach, aimed at lifelong learning, responsive to change and needs, and prepared to deal with the whole student. A model program that meets these goals — the Integrated Technology Classroom — is being piloted in each of the elementary schools in the district. In one of these schools, the special education teacher has adapted the ITC approach for her primary age students with developmental delays or mental retardation. Multimedia projects are developed within the context of an integrated curriculum to help students acquire specific knowledge and skills. Classroom activities include research using videodisc and videotape as a primary information source, computer word processing and graphics creation, and videotape recording and editing.

Norfolk Public Schools
Norfolk, Virginia
Training and Technical Assistance for Special Education Teachers and Students

Norfolk Public Schools aims for full inclusion of students with disabilities into all programs offered by the district. Special Education Director Shirley Underwood and her staff believe that full inclusion is reachable with technology, but only to the extent that teachers and students know how to take advantage of it. The Norfolk Public Schools Department of Special Educational Services has created a position designated to provide technology-related assistance to all special education students and teachers. This position has allowed both teachers and students to develop the skills that are necessary to effectively use the technology provided. The availability of this support has allowed the implementation of a number of promising instructional applications of technology, including the use of appropriate microcomputer technology to allow students with physical and other disabilities to participate more fully in mainstream classes.

Bucks County Intermediate Unit
Doylestown, Pennsylvania
Technology Specialist Position Supporting Special Education Students and Staff

The Bucks County Intermediate Unit, one of 29 units in the Pennsylvania regional education system, provides centralized programs and support services for the 13 school districts in its service area. The IU supports a Technology Specialist position to serve the many technology needs of teachers, students, and related services staff. Technical assistance is readily available through this itinerant specialist, who has promoted successful integration of technology for many special education classes and individual students. The Technology Specialist position evolves, based on new and changing needs and technologies. Among the activities carried out by the Technology Specialist are formal teacher training and ongoing technical assistance, direct instruction to students in the use of their adaptive technology, development and adaptation of software and hardware for student use, and coordination of special projects that directly benefit students in the school districts served.

Resource Materials Center for the Hearing Impaired, Florida School for the Deaf and the Blind
St. Augustine, Florida
Statewide Training and Technical Assistance to Promote Technology Integration

The Resource Materials Center is a specialized center in the Florida Diagnostic Learning and Resources System, which is housed at the Florida School for the Deaf and the Blind in St. Augustine. The center serves hearing impaired students and their teachers and administrators throughout the State. It consists of two component centers — the Computer Resource Center and the Educational Television and Captioning Center. Recognizing that successful integration of technology is based on maximizing teachers' effectiveness, the staff of the RMC provide quality resources, accessible training opportunities, and efficient technical assistance to the benefit of students with hearing impairments throughout the State. The center's activities include: developing and distributing a software evaluation guidebook; enrolling teachers as demonstrators and trainers for other teachers; and providing direct training and technical assistance to teachers and administrators.

Crestwood Community School District
Mantua, Ohio
Switches and Electronic Devices for Communication and Environmental Control

The Crestwood Community School District provides educational services for students residing at the Hattie Larlham Foundation, a residential facility for severely and profoundly multiply disabled children and young adults. Most of the residents function cognitively in the 2- to 6-month range and have severe physical disabilities. Switches with a variety of electrical and electronic devices are employed to allow students to communicate and exert some control over the environment. The district has purchased a variety of switches, timing devices, dedicated communications devices such as Whisper Wolf and IntroTalker, and an adaptive firmware card for their Apple IIGS computer. The application of this technology has supported the adoption of a functional curriculum that provides many opportunities for creativity and renewal among the staff. Staff have found that the range of activities in which students can participate has increased since the introduction of technology into the program and are continually working to create new applications of the technology in the classroom.

Further Reading: Technology, Disability, and Restructuring

American Association of School Administrators. (1991). *Systemic leadership for a new era*. Arlington, VA: American Association of School Administrators.

Boone, R. & K. Higgins, eds. (1992). *Multimedia: TAM topic guide #1*. Reston, VA: Council for Exceptional Children.

Church, G. & M. Bender. (1989). *Teaching with computers: A curriculum for special educators*. Boston, MA: College Hill Press.

Cromer, J.L. & E.D. Steinberger. (1988). *On line: Computers in education: What's happening? What's possible*. Alexandria, VA: National School Boards Association.

Cromer, J.L. & E.D. Steinberger. (1989). *On line: Financing strategies for educational technology*. Alexandria, VA: National School Boards Association.

Cromer, J.L. & E.D. Steinberger. (1989). *On line: Policies and planning for educational technology*. Alexandria, VA: National School Boards Association.

Daggett, W.R. (1992). Job skills of 90's requires new educational model for all students. *Liaison Bulletin*. 18 (5), 1-17.

Dwyer, D.C., C. Ringstaff & J.H. Sandholtz. (1991). Changes in teachers' beliefs and practices in technology-rich classrooms. *Educational Leadership*. 48 (4), 45-52.

Goodson, B. (1991). *Teachers and technology: Staff development for tomorrow's schools*. Alexandria, VA: National School Boards Association.

Hill, F. (1988). *Tomorrow's learning environment: Planning for technology: The basics*. Alexandria, VA: National School Boards Association.

Hotzberg, C.S. (1992). Technology for special education. A directory of resources. *Technology and Learning*. May/June, 24-26, 35.

Kay, A.C. (1991). Computers, networks, and education. *Scientific American*. September, 138-148.

Lieberman, A. & M.W. McLaughlin. (1992). Networks for educational change: Powerful and problematic. *Phi Delta Kappan*, 73 (9), 673-677.

Livesay, J.M. & P.E. Murray. (1992). Promoting the integration of instructional technology into special education: An organizational process model. *Technology and Disability*. 1 (1). 7-18.

Male, M. (1988). *Special magic: Computers, classroom strategies, and exceptional students*. Mountain View, CA: Mayfield Publishing Company.

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Malouf, D.B., P.J. Jamison, M.H. Kerchler, & C.M. Carlucci. (1991). Computer software aids effective instruction. *Teaching Exceptional Children*. 23 (2), 56-57.

Morgan, B. (1991). 101 things you want to know about educational technology. *Electronic Learning*. 10 (8), 25-35.

National School Boards Association. (1991). *Bridging the learning gap: Selecting and implementing an integrated learning system*. Alexandria, VA: National School Boards Association.

November, A.C. (1990). The emerging role of the computer coordinator. *Electronic Learning*. 9 (7), 8-9.

Perelman, L.J. (1987). *Technology and transformation of schools*. Alexandria, VA: National Schools Boards Association.

U.S. Congress Office of Technology Assessment. (1988). *Power on! New tools for teaching and learning*. Washington, DC: U.S. Government Printing Office.

U.S. Congress Office of Technology Assessment. (1989). *Linking for learning: A new course for education*. Washington DC: Government Printing Office.